maintains the decreased brightness of the at least a partial region during the display of the at least a partial region.

[0086] In an example, the processor adjusts the brightness of the peripheral region as the at least a partial region. The processor decreases and maintains the brightness of the peripheral region such that the user viewing the viewpoint region may exaggeratedly realize a phenomenon of realizing the viewpoint region to have a relatively high brightness in response to a periphery having a relatively low brightness.

[0087] The processor maintains the brightness of the peripheral region without a change, in response to the difference between the viewpoint brightness information and the peripheral brightness information being less than or equal to the first emphasis threshold and being greater than or equal to the second emphasis threshold.

[0088] FIG. **8** illustrates an example of adjusting a brightness of a display in accordance with one or more embodiments.

[0089] FIG. **8** illustrates an example of adjusting the at least a partial region, for example, a peripheral region, based the aforementioned method with reference to FIG. **7**. However, the peripheral region is not limited to examples illustrated in FIG. **8**, and sizes and forms of the peripheral region may be variously set as desired.

[0090] In an example, at a predetermined viewpoint **810** in illustration **801** of FIG. **8**, a processor may not change the brightness of the peripheral region in response to a brightness difference between a viewpoint region **811** and the peripheral region being less than or equal to a first emphasis threshold and being greater than or equal to a second emphasis threshold. Illustration **802** demonstrates an example of changing the brightness of the peripheral region.

[0091] As an example, as illustrated in the illustration **802** of FIG. **8**, a brightness difference between a viewpoint region **821** and a peripheral region **822** is greater than the first emphasis threshold at the viewpoint **820**. The processor may decrease a brightness of the peripheral region **822** as described in operation **733** of FIG. **7**, for example.

[0092] In another example, as demonstrated in illustration **803** of FIG. **8**, a brightness difference between a viewpoint region and a peripheral region **832** is less than the second emphasis threshold at the viewpoint **830**. The processor may increase the brightness of the peripheral region as described in operation **732** of FIG. **7**, for example.

[0093] FIG. **8** illustrates that brightness changes of the peripheral regions **822** and **832** are oppositely applied to corresponding regions in potentially similar proportions, however, the brightness changes are not limited thereto. For example, the processor may increase or decrease a brightness such that a difference in brightness is gradually reduced in proportion to the increase in distance to an outer boundary of the peripheral region **822** or in proportion to the distance from the center of the viewpoint **820**. Therefore, a sense of disharmony of the peripheral region **822** and other regions may be reduced. The foregoing example may also be similarly or identically applied to the peripheral region **832**.

[0094] FIG. **8** illustrates an example of the display changing the brightness of the peripheral region, however, the display is not limited thereto. As illustrated in FIG. **5**, the processor may change a brightness of a viewpoint region, and concurrently change a brightness of a peripheral region.

[0095] FIGS. **9** and **10** are block diagrams illustrating an example of a display brightness adjusting device in accordance with one or more embodiments.

[0096] A display brightness adjusting device **900** includes a processor **910** and a display **920**. The processor **910** calculates viewpoint brightness information on a viewpoint corresponding to a viewpoint of a user on the display **920**, calculates previous brightness information on a viewpoint region at a previous timing, and adjusts a brightness of at least a partial region of the display **920** based on the calculated viewpoint brightness information and the previous brightness information.

[0097] The processor **910** calculates the viewpoint brightness information on the viewpoint region corresponding to the viewpoint of the user on the display **920**, calculates peripheral brightness information on a peripheral region with respect to a periphery of the viewpoint region, and adjusts the brightness of at least a partial region of the display **920** based on the viewpoint brightness information and the peripheral brightness information.

[0098] The display **920** displays an image. The processor **910** controls the display **920** to adjust a brightness according to a brightness of a predetermined region of the image.

[0099] The display brightness adjusting device **900** further includes a memory **1030**. The memory **1030** stores a program including instructions to perform any or any combination of the methods of FIGS. **3-8**. In an embodiment, the memory **1030** may semipermanently or temporarily store data including viewpoint brightness information, peripheral brightness information, previous brightness information, and a brightness difference made available for performing, by the processor **910**, any or any combination of the aforementioned methods of adjusting a brightness of the display **920**.

[0100] The display brightness adjusting device **900** may further include a sensor **930** to track a head and a sensor track a gaze or eyes of the user. The sensor **930** to track a head may track a head movement of a user through a camera, or may be mounted to the head of the user to track the head movement by measuring acceleration in a case of a head mounted display (HMD). The sensor **930** may track the gaze and may be a camera, as an example, to track a movement of a pupil.

[0101] The display brightness adjusting device **900** may be incorporated into, or be, a virtual reality (VR) device, an augmented reality (AR) device or another electronic device to which a display, for example, a smartphone or a tablet personal computer (PC), is attached.

[0102] The display brightness adjusting device **900** allows the user to realize a sense of reality while the user is viewing an image by forcibly compensating, to a display, a change in time adaption based on a brightness change and a difference in contrast with a color distribution on a peripheral space. For example, the display brightness adjusting device **900** may provide a realistic image by forcibly compensating light intensity by applying a time adaption, a dark reaction and a light reaction, corresponding to physiological reactions of a visual cells to a brightness change in response to a viewpoint changed to a display portion having a relatively high brightness and a display portion having a relatively low brightness in an image. Therefore, the display brightness adjusting device **900** may compare a brightness at a current viewpoint to a brightness at a previous viewpoint and apply a brightness effect with respect to the current viewpoint, thereby maximizing the brightness effect to be brighter than an actual brightness.